



## Rain Towers

### ★ TEKS

#### Science - Ch112

Grades	3-6	2.1	2.2	2.4	2.5	2.7	2.10	3.1	3.2	3.4	3.5	3.7	3.11	4.2	4.3	4.4
Duration	60min	4.5	4.7	4.11	5.1	5.2	5.4	5.7	5.12							
Setting	Classroom															

**Focus** Demonstrate water erosion.

➡ Read side 2 for Background.

**Objective** The student's task is to explore the structural effects of water erosion.

- Procedure**
1. Working in pairs, have the students cover their workspace with newspaper.
  2. Lead the students in creating a sprinkling can: Hammer 10 small holes in the bottom of one tin can. Set the can aside. In the remaining three cans, hammer 5 small drainage holes.
  3. Show the students how to make masking tape labels for these three cans. Labels should read: *Dry Soil*, *Light Rain*, *Heavy Rain*. Then label each tin
  4. Have the students fill these cans with potting soil, pressing down firmly, until the soil is even with the cans' rims.
  5. Place the soil-filled tins into the wide container.
  6. In each soil-filled tin, have students place two pebbles, two pennies, and one rock. *Be sure the pennies aren't stacked.*
  7. Invite the students to speculate on the difference dryness, light rain and heavy rain will have on the soil in their cans.
  8. Using the measuring cup to pour water into the sprinkling can, have students simulate a light rain on the tin labeled, *Light Rain*.
  9. Repeat Step#6 on the tin labeled Heavy Rain. This time using more water, but not so much as to create puddles on the soil surface. Record results and discuss.
    - *What did they observe?*
    - *If we continued without saturating the soil, what might eventually happen to the soil beneath each item in the can?*

### Materials

*Per group or pair of students*

- 4 tin cans
- 1 journal page
- 6 pebbles
- 6 pennies
- 3 rocks
- 1 wide container
- potting soil
- newspaper
- hammer
- nail
- masking tape
- marker
- measuring cup



### Did You Know?

*Melting glaciers & polar ice have already raised sea levels 4in to 8inches since the mid-1800s.*

*It takes about 500 years for one inch of topsoil to form. Researchers have found that some soils in India, Africa and Australia are more than 2million years old.*

➡ Read side 2 for Background.



## Rain Towers

### Background

Two processes continually occur on Earth: those that modify it or build it up, and those that break it down. Forces such as volcanic eruptions, earthquakes, and the movement of magma continually push up and create new land, while forces such as weathering and erosion wear down the land. Erosion occurs when wind, water, and glaciers move weathered particles to other locations. The process is powerful enough to form deep valleys, as well as level hills and mountains.

#### Mechanics of Erosion

**Soil erosion** is the loss of topsoil (the nutrient-rich surface layer) from the ground. This usually happens because of the movement of air (wind) and water. Heavy rains wash away the soil, especially where the ground slopes and there are no plants, or where plant roots have not yet taken hold.

When the soil is dry, the wind causes erosion. During a period of dry weather (**drought**), wind erosion is a big problem for farmers. They lose huge amounts of rich topsoil to the wind. Farmers often plant **windbreaks**—thick rows of trees and other plants to line their fields and slow down erosion.

**Wind erosion** is most obvious in dry, desert areas. In regions where there is no sheltering vegetation, the wind can strip off dry soils. Only small particles are carried by the wind. But the force of flowing water, or **hydraulic action**, can move much larger fragments.

The faster the water flows, the larger the fragments are that it is able to shift. Water from rainfall or melting snow that runs downhill often takes particles of rock and soil along with it. Rocks carried along in the water are gradually reduced in size, and become smooth and rounded as they bounce along the riverbed and against each other. This process is called **attrition**, and it happens also to smaller, windblown particles.

Most of the power of wind, water and ice to strip away rocks comes from the abrasive effect of the rock fragments which these mediums carry. This is called **corrasion**. In deserts, windblown sand scours rock surfaces into fantastic honeycomb shapes. Rocks carried by a river current widen the actual riverbed by knocking out more material along the way. Along shorelines, the tides grind sand and pebbles against rock surfaces.

#### Two Weathering Methods

Weathering, which is a long, slow process, is the continuous breaking down of rock. Weathering can be physical or chemical. **Physical weathering** happens when wind, water, and temperature changes break down rocks into smaller pieces without changing the minerals in the rock. **Chemical weathering** occurs when chemicals created from certain acids,

and water, break down rocks. Chemical weathering actually alters the minerals in the rocks.

The two weathering processes work together. Physical weathering exposes new surfaces of rock that can be acted upon more easily by chemical weathering. At any depth accessible to air and water, rocks are weathered physically and chemically. (That's how caves are formed.)

#### The Role of Roots

The movement of soil particles, or erosion, happens most often when the soil is bare or unplanted. There are two main reasons for this. First, plants set up a barrier to slow and redirect rain running down a hill. When water is slowed down, it cannot carry as much topsoil away. Second, as some plant material decays, it acts like a sponge, soaking up the rainwater. This prevents the water from running off and carrying soil with it.

#### Erosion Structures

**Canyons** are some of the most obvious structures that result from prolonged wind and water erosion. They are steep-walled chasms, gorges or ravines cut into the surface of the Earth by running water. The steep walls and/or cliffs are characteristic of any canyon. Moving water also forms **ravines**, the walls of which are much less steep; a simple depression in soil created by water, can be termed a ravine. A **gully** is a small ravine—too deep to be eliminated by plowing or crossed by a wheeled vehicle. Moving water could also form a **gorge**—distinguished by its precipitous, rocky sides and always enclosed among mountains. Ravines and gullies needn't be enclosed. Gorges are understood as a type of canyon.

Another formidable structure created by wind and water wear is a **pinnacle**. These high, lean, pointed masses result when the materials that surround them have eroded more easily, leaving these tall, often spire-shaped pillar of rock alone or cresting on a mountains summit.



#### Did You Know?

*In 1850, there were more than 150 glaciers in Glacier National Park. By the late 1990s, there were fewer than 50. —At this rate of recession, all of these glaciers will be gone by 2040.*

#### Bibliography & Sources

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